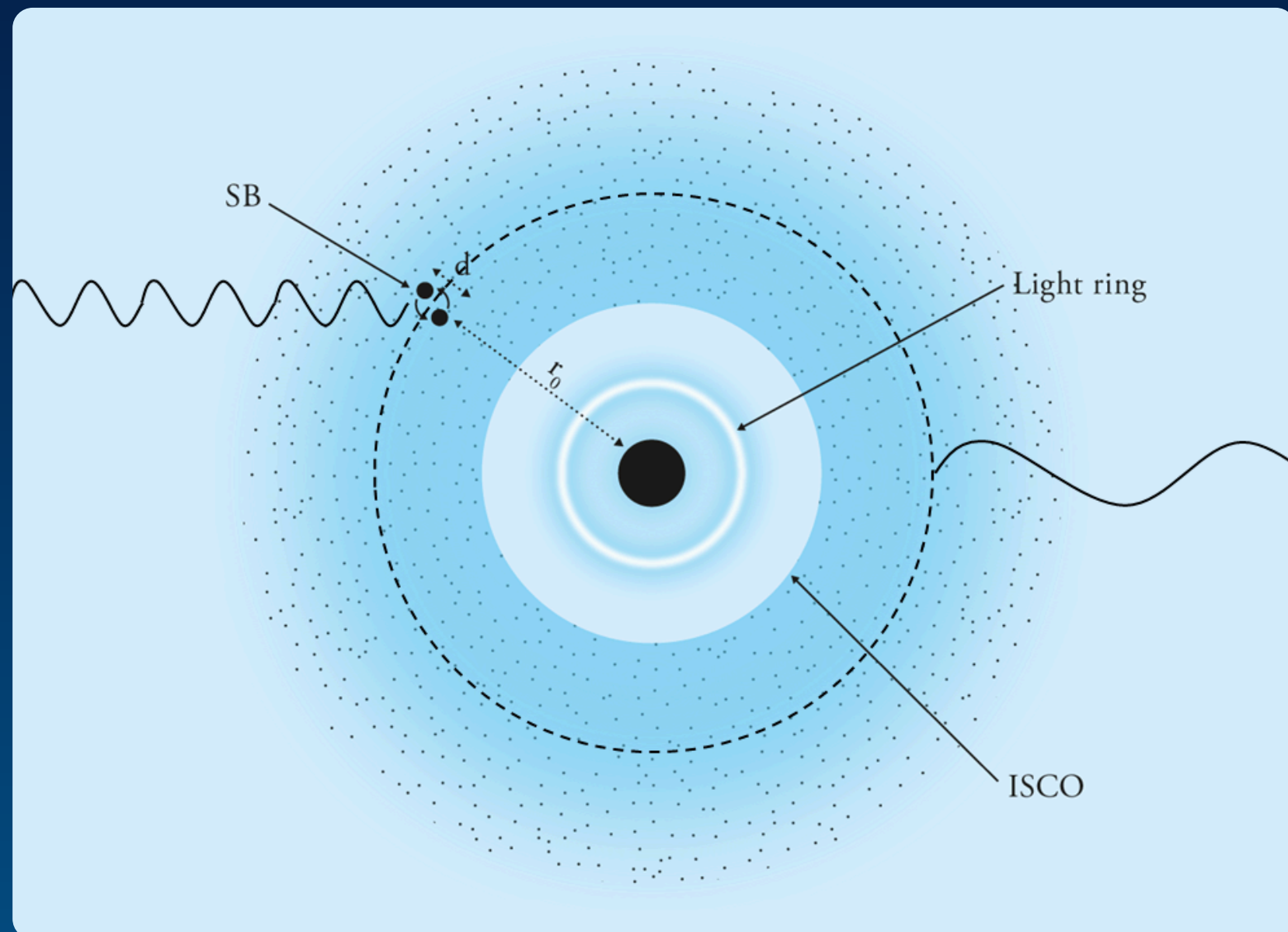


RADIO ORBITING A SUPERMASSIVE KERR BLACK HOLE

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GW: Gravitational Wave SMBH: Supermassive Black Hole B-EMRI: Binary Extreme Mass Ratio Inspiral



High Frequency: stellar mass binary
Low Frequency: orbit around SMBH

What we knew: how an EMRI and a binary system emit GWs, separately.

Recent work by CENTRA and CoG found out how the 3 body system radiates - **from first principles!**

Our Goal - to replace the SB with an oscillating electric dipole.

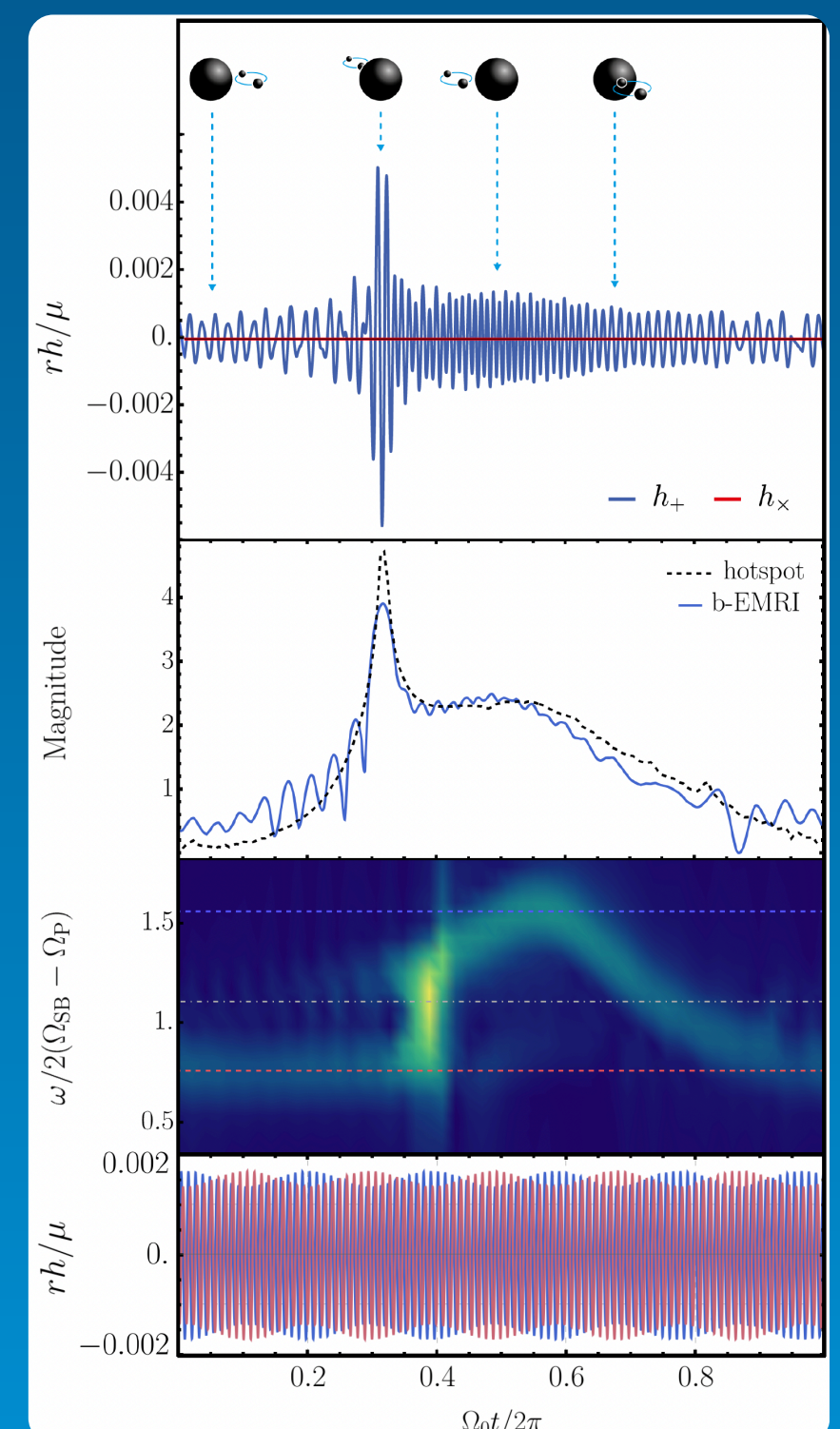
First time that these computations - **electric dipole radiation around a SMBH** - are performed from **first principles!**

What do we expect?

Results should closely mimic GW emission (on the right) with some **key differences:**

- Closer agreement with **hotspot simulations** - 2nd graph on the right.
- Clear signature of the **vectorial** character - different from **tensorial** case!
- **Beaming** and **Doppler** shift from first principles - high frequency radiation.

Next step: compute the energy momentum tensor, then use the Teukolsky Equation to compute the waveforms



REFERENCES

- [1] JSS *et al*, eprint arXiv:2506.14868
[2] S. Teukolsky, *Astrophys.J.* 185 635-647 (1973)